

(19)



(11)

EP 3 565 283 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
28.07.2021 Bulletin 2021/30

(51) Int Cl.:
H04W 4/02 ^(2018.01) **H04W 4/08** ^(2009.01)
H04W 4/40 ^(2018.01) **H04W 64/00** ^(2009.01)

(21) Application number: **17894410.4**

(86) International application number:
PCT/CN2017/106094

(22) Date of filing: **13.10.2017**

(87) International publication number:
WO 2018/137362 (02.08.2018 Gazette 2018/31)

(54) POSITIONING METHOD AND DEVICE

POSITIONIERUNGSVERFAHREN UND -VORRICHTUNG

PROCÉDÉ ET DISPOSITIF DE POSITIONNEMENT

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(30) Priority: **24.01.2017 CN 201710060298**

(43) Date of publication of application:
06.11.2019 Bulletin 2019/45

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(56) References cited:
**CN-A- 102 628 690 CN-A- 103 389 486
CN-A- 103 548 374 CN-A- 103 869 814
CN-A- 103 941 226 CN-A- 106 332 274
US-A1- 2011 217 989 US-A1- 2014 092 236**

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Description**TECHNICAL FIELD**

[0001] This application relates to the field of communications technologies, and in particular, to a positioning method and a device.

BACKGROUND

[0002] Automated driving means that a vehicle can drive safely at any time in any scenarios. The any scenarios include various special driving environments, such as a tunnel, a mountain, a bridge, and an overpass. A positioning technology is most critical in technologies for implementing automated driving, and a high-precision positioning technology is a basis for ensuring safe driving of the vehicle.

[0003] At present, an in-vehicle terminal in a vehicle determines a location of the vehicle by receiving a Global Positioning System (GPS) signal. However, when the in-vehicle terminal in the vehicle cannot receive the GPS signal in some special scenarios such as a tunnel and a mountain, the following technical solution is used for positioning in the prior art. Specifically, a high-precision map with topographic features is prestored in the in-vehicle terminal. In addition to necessary road information, the high-precision map further provides 3D images and high-precision location information of fixed objects such as a building and a landmark object around a road. The in-vehicle terminal scans a surrounding environment by using a 64-line laser radar, to obtain a 3D image. The in-vehicle terminal compares the scanned 3D image with the prestored high-precision map to determine location information of the vehicle.

[0004] However, in this positioning manner, the high-precision map with topographical features that is prestored in the in-vehicle terminal is difficult to produce, and has relatively poor maintainability. If the high-precision map is not updated in a timely manner, positioning accuracy is seriously affected, resulting in a traffic accident. To sum up, when the GPS signal cannot be received, the existing positioning manner has relatively poor practicality. US 2014/092236 A1 discloses a positioning system for a vehicle that includes a camera, a processor unit and a data storage device. A length relating to a feature of the vehicle is stored in the data storage device. The vehicle is positioned for an inductive charging process in that the vehicle is recorded by a camera and a feature of the vehicle is detected. The position relating to a feature is calculated.

SUMMARY

[0005] This application provides positioning methods of claims 1 and 2, and related devices of claims 5 and 7, to improve operability of positioning when there is no GPS signal. Possible implementation manners are disclosed

in the dependent claims.

BRIEF DESCRIPTION OF DRAWINGS

[0006]

FIG. 1 is a schematic flowchart of a positioning method according to an embodiment of this application; FIG. 2 is a schematic diagram of an application scenario according to an embodiment of this application; FIG. 3 is a schematic flowchart of a positioning method according to an embodiment of this application; FIG. 4 is a schematic flowchart of a positioning method according to an embodiment of this application; FIG. 5a is a schematic structural diagram of a first device according to an embodiment of this application; FIG. 5b is a schematic diagram of a hardware structure of a first device according to an embodiment of this application; FIG. 6a is a schematic structural diagram of a second device according to an embodiment of this application; FIG. 6b is a schematic diagram of a hardware structure of a second device according to an embodiment of this application; FIG. 7a is a schematic structural diagram of a communications device according to an embodiment of this application; FIG. 7b is a schematic diagram of a hardware structure of a communications device according to an embodiment of this application; FIG. 8a is a schematic structural diagram of a second device according to an embodiment of this application; and FIG. 8b is a schematic diagram of a hardware structure of a second device according to an embodiment of this application.

DESCRIPTION OF EMBODIMENTS

[0007] The embodiments of this application may be applied to scenarios such as vehicle positioning, pedestrian positioning, and obstacle positioning in a transportation system, and may also be applied to a scenario in which a robot locates an indoor or outdoor target object, and the like.

[0008] Vehicle positioning applied to the transportation system is used as an example to describe the embodiments of this application in detail. A positioning manner applied to another application scenario is similar to a vehicle positioning manner applied to the scenario of the transportation system. Details are not described herein again.

[0009] In the embodiments of this application, a first device can determine absolute location information of a target object according to prestored absolute location information of the first device and a detection signal that

is obtained when a sensor detects the target object, and can send, by using a wireless network, the absolute location information that is of the target object and that is determined by the first device to a second device disposed on the target object, so that the second device can implement positioning of the target object according to the absolute location information that is of the target object and that is sent by the first device. Therefore, this resolves a prior-art problem that positioning of a target object cannot be implemented when there is no GPS signal. Compared with a solution in the prior art that positioning of a target object is implemented by scanning a surrounding object of the target object and performing comparison with a preset high-precision map, this solution is easy to implement, improves operability of positioning, and increases positioning precision of the target object by increasing precision of the sensor.

[0010] As shown in FIG. 1, a positioning method in an embodiment of this application includes the following steps.

[0011] A first device detects, by using a sensor, a target object that occurs within a range detectable to the sensor.

[0012] The first device performs step 100 to step 130 when the sensor detects any target object.

[0013] Step 100. The first device determines relative location information of the first device relative to the target object according to a detection signal that is obtained when the sensor detects the target object, where a second device having a communication function is disposed on each target object.

[0014] Step 110. The first device determines absolute location information of the target object according to the relative location information and prestored absolute location information of the first device.

[0015] Step 120. The first device sends, by using a wireless network, the absolute location information of the target object to the second device disposed on the target object.

[0016] Step 130. The second device receives, by using the wireless network, absolute location information that is of a first target object and that is sent by at least one first device, where the target object in which the second device is located is the first target object, and the absolute location information of the first target object is one piece of absolute information that is of a target location and that is determined by the at least one first device.

[0017] Step 140. The second device determines positioning information of the first target object according to the absolute location information of the first target object that is sent by the at least one first device.

[0018] It should be understood that, in this embodiment of this application, the wireless network may be a mobile data network provided by an operator, for example, a network of a network standard such as Long Term Evolution (Long Term Evolution, LTE), or a wireless local area network (Wireless Local Area Networks, WLAN).

[0019] It should be understood that in this embodiment of this application, each first device may be bound to one

sensor, or may be bound to a plurality of sensors. The sensor in this embodiment of this application may be a video camera or a camera, or may be a sensing device such as a laser radar or a millimeter wave radar. Specifically, the sensor may be disposed on the first device, or may send a detection signal to the first device in a wireless or wired manner. The first device is a device having a communication function.

[0020] The following uses FIG. 2 as an example for detailed description. As shown in FIG. 2, a sensor T1, a sensor T2, and a sensor T3 are video cameras. Each of the sensor T1, the sensor T2, and the sensor T3 is fastened on a fixed object. The fixed object may be a utility pole, a building, or the like. A vehicle C1, a vehicle C2, a vehicle C3, and a vehicle C4 are target objects, and a second device having a communication function is disposed on each of the vehicle C1, the vehicle C2, the vehicle C3, and the vehicle C4. The second device may be a smart terminal device, for example, an in-vehicle station, a smart phone, a notebook computer, a palmtop computer, or a tablet computer.

[0021] The T1 is used as an example. The T1 is disposed on a first device 1. Because a range detectable to the T1 is limited, if the T1 can detect only the C1, C2, and C3 within the detectable range, the T1 sends image information of photographed C1, C2, and C3 to the first device 1 after photographing the C1, C2, and C3. In this case, a detection signal is the image information of the T1-photographed C1, C2, and C3.

[0022] The first device 1 determines relative location information of the first device 1 relative to the C1, relative location information of the first device 1 relative to the C2, and relative location information of the first device 1 relative to the C3 according to the image information of the T1-photographed C1, C2, and C3, respectively. Absolute location information of the first device 1 is measured in advance and stored in the first device 1. For example, the absolute location information of the first device 1 is (x1, y1, z1), where x1 is used to indicate a longitude of the first device 1, y1 is used to indicate a latitude of the first device 1, and z1 is used to indicate a height of the first device 1. The first device 1 may determine absolute location information of the C1 by using the relative location information relative to the C1 and the absolute location information of the first device 1, determine absolute location information of the C2 by using the relative location information relative to the C2 and the absolute location information of the first device 1, and determine absolute location information of the C3 by using the relative location information relative to the C3 and the absolute location information of the first device 1. Then, the first device 1 sends the absolute location information of the C1 to a second device 1 disposed on the C1, sends the absolute location information of the C2 to a second device 2 disposed on the C2, and sends the absolute location information of the C3 to a second device 3 disposed on the C3.

[0023] If the T2 is disposed on a first device 2 and the

T3 is disposed on a first device 3, the T2 can detect the C1, C2, C3, and C4 within a detectable range, and the T3 can detect the C2, C3, and C4 within a detectable range, a manner of determining absolute location information of the C1, C2, C3, and C4 by the first device 2 and a manner of determining absolute location information of the C2, C3, and C4 by the first device 3 are similar to a manner of determining the absolute location information of the C1, C2, and C3 by the first device 1. Details are not described herein again.

[0024] Specifically, a manner of sending the absolute location information of the C1 to the second device 1 disposed on the C1 by the first device 2, a manner of sending the absolute location information of the C2 to the second device 2 disposed on the C2 by the first device 2, a manner of sending the absolute location information of the C3 to the second device 3 disposed on the C3 by the first device 2, a manner of sending the absolute location information of the C4 to the second device 4 disposed on the C4 by the first device 2, a manner of sending the absolute location information of the C2 to the second device 2 disposed on the C2 by the first device 3, a manner of sending the absolute location information of the C3 to the second device 3 disposed on the C3 by the first device 3, and a manner of sending the absolute location information of the C4 to the second device 4 disposed on the C4 by the first device 3, a manner of sending the absolute location information of the C2 to the second device 2 disposed on the C2 by the first device 1, and a manner of sending the absolute location information of the C3 to the second device 3 disposed on the C3 by the first device 1 are similar to a manner of sending the absolute location information of the C1 to the second device 1 disposed on the C1 by the first device 1. Therefore, the following uses the manner of sending the absolute location information of the C1 to the second device 1 disposed on the C1 by the first device 1 as an example for detailed description.

[0025] The first device 1 obtains, by using the T1, a target object identifier attached to the C1. Specifically, an optional implementation is: The first device 1 obtains, from the image information of the T1-detected C1, C2 and C3, the target object identifier attached to the C1, and sends, by using the wireless network, the target object identifier and the absolute location information of the C1 to the second device 1 disposed on the C1. When the C1 is a vehicle, the target object identifier may be a vehicle license plate number. After receiving the target object identifier and the absolute location information of the C1, the second device 1 determines, by using the target object identifier, that received absolute location information is the absolute location information of the C1.

[0026] A possible implementation in which the first device 1 sends, by using the target object identifier, the absolute location information of the C1 to the second device 1 is: The first device 1 may send a correspondence between the target object identifier and the absolute location information of the C1 to an intelligent transporta-

tion system; then, the intelligent transportation system finds an identifier of the second device 1 from a prestored correspondence between a target object identifier and a second-device identifier according to the target object identifier, and sends the absolute location information of the C1 to the second device 1 according to the identifier of the second device 1. For example, when the second device 1 is a smart phone, an identifier may be a network identifier that can be used to indicate identifier information of the second device 1, for example, a mobile phone number or a user equipment identifier (User Equipment Identification, UE_ID). The identifier may alternatively be a network address, for example, a Media Access Control address (Media Access Control Address, MAC Address) or an Internet Protocol address (Internet Protocol Address, IP Address). In this sending manner, the second device 1 can directly receive the absolute location information of the C1, without receiving absolute location information of another target object different from the absolute location information of the C1. Another possible implementation in which the first device 1 sends, by using the target object identifier, the absolute location information of the C1 to the second device 1 is: The first device 1 broadcasts a data packet by using the wireless network, and the data packet includes a correspondence between the target object identifier of the C1 and the absolute location information of the C1. In a specific implementation, the first device 1 can separately determine the absolute location information of the C1, C2, and C3. Therefore, the first device 1 may encapsulate the correspondence between the target object identifier of the C1 and the absolute location information of the C1, a correspondence between a target object identifier of the C2 and the absolute location information of the C2, and a correspondence between a target object identifier of the C3 and the absolute location information of the C3 into one data packet for broadcasting, or may encapsulate the correspondence between the target object identifier of the C1 and the absolute location information of the C1, a correspondence between a target object identifier of the C2 and the absolute location information of the C2, and a correspondence between a target object identifier of the C3 and the absolute location information of the C3 separately into three data packets for broadcasting. After receiving the data packet, the second device 1 determines, from the correspondences included in the data packet, the absolute location information of the C1 corresponding to the target object identifier of the C1.

[0027] A third possible implementation in which the first device 1 sends, by using the target object identifier, the absolute location information of the C1 to the second device 1 is: A correspondence between a target object identifier and a second-device identifier is prestored in the first device 1. The first device 1 determines an identifier of the second device 1 from the prestored correspondence between the target object identifier and the second-device identifier according to the target object identifier of the C1; then, the first device 1 sends the

absolute location information of the C1 to the second device 1. In this way, the absolute location information of the C1 can be directly sent to the second device 1 without using the intelligent transportation system. A fourth possible implementation in which the first device 1 sends, by using the target object identifier, the absolute location information of the C1 to the second device 1 is: A correspondence between a target object identifier and a second-device identifier is prestored in the first device 1. The first device 1 determines an identifier of the second device 1 from the prestored correspondence between the target object identifier and the second-device identifier according to the target object identifier of the C1, and then broadcasts a data packet, where the data packet includes the correspondence between the identifier of the second device 1 and the absolute location information of the C1. The first device 1 can separately determine the absolute location information of the C1, C2, and C3. Therefore, the first device 1 may encapsulate the correspondence between the target object identifier of the C1 and the absolute location information of the C1, a correspondence between a target object identifier of the C2 and the absolute location information of the C2, and a correspondence between a target object identifier of the C3 and the absolute location information of the C3 into one data packet for broadcasting, or may encapsulate the correspondence between the target object identifier of the C1 and the absolute location information of the C1, a correspondence between a target object identifier of the C2 and the absolute location information of the C2, and a correspondence between a target object identifier of the C3 and the absolute location information of the C3 separately into three data packets for broadcasting. After receiving the data packet, the second device 1 determines, from the correspondences included in the data packet, the absolute location information of the C1 corresponding to the target object identifier of the C1.

[0028] In addition, appearance image information of a driver may also be photographed when the sensor is a video camera or a camera. An identification number of the driver may be obtained by using the appearance image information of the driver, so that the identifier of the second device is obtained based on the identification number of the driver.

[0029] It should be noted that, in this embodiment of this application, when the target object is a vehicle, in addition to the vehicle license plate number, the target object identifier may alternatively be external characteristic information of the vehicle, such as a brand, a color, and an aging degree of the vehicle.

[0030] When the sensor is a laser radar or another sensor incapable of obtaining image information, the first device may determine the identifier of the second device in the following manner.

[0031] The first device determines the identifier of the second device in the wireless network by using a radio signal sent by the second device. Specifically, the radio signal may be a cell handover signal, a reference signal,

or the like. When the target object is located in a cell handover area, the second device sends a cell handover signal to a network device. The first device obtains the cell handover signal, and extracts the identifier of the second device from the handover signal. Alternatively, the first device obtains a reference signal of the second device, and extracts the identifier of the second device from the reference signal.

[0032] In addition, when the sensor is a laser radar or another sensor incapable of obtaining image information, the sensor may send laser or another signal to the target object and then measure a signal that is returned after the signal sent by the sensor reaches the target object, to determine the relative location information of the first device relative to the target object. In this case, the sensor is usually disposed on the first device. In this embodiment of this application, a quantity of sensors disposed on the first device is not limited.

[0033] Using FIG. 2 as an example, both the first device 1 and the first device 2 can determine the absolute location information of the C1, and the second device 1 can receive at least the absolute location information of the C1 sent by the first device 1 and the absolute location information of the C1 sent by the first device 2.

[0034] Specifically, the second device 1 may randomly select, as positioning information of the C1, one piece of absolute location information in the absolute location information of the C1 sent by the first device 1 and the first device 2. To make the positioning information more accurate, the second device 1 may determine the positioning information of the C1 as an average value of the absolute location information of the C1 sent by the first device 1 and the first device 2. In addition, another location calculation algorithm in the prior art is also applicable to this application, and this is not limited herein.

[0035] In addition, the first device may also upload the determined absolute location information of the target object to the intelligent transportation system, or the second device uploads the positioning information of the target object to the intelligent transportation system, so that the intelligent transportation system records the absolute location information of the target object, to help a staff know a traffic condition in a timely manner.

[0036] As shown in FIG. 3, a positioning method in an embodiment of this application includes the following steps.

[0037] Step 300. During motion of a moving target object, a communications device disposed on the moving target object detects, by using a sensor installed on the moving target object, an identifier of at least one fixed object occurring in a moving environment, and determines relative location information of the moving target object relative to the at least one fixed object by using the sensor.

[0038] Step 301. The communications device determines, from a preset correspondence between a fixed-object identifier and absolute location information according to the identifier of the at least one fixed object,

absolute location information corresponding to the identifier of the at least one fixed object.

[0039] Step 302. The communications device estimates positioning information of the moving target object according to the absolute location information of the at least one fixed object and the relative location information of the moving target object relative to the at least one fixed object.

[0040] It should be understood that, in this embodiment of this application, the communications device may be such communications devices as a smart phone, an in-vehicle station, a notebook computer, and a tablet computer, and the fixed object may be a fixedly-located object such as a building or a tree. An identifier of the fixed object is preallocated to the fixed object, and the identifier of the fixed object may be a building name, a numeral identifier allocated to a tree, or the like. The identifier of the fixed object is in a one-to-one correspondence with absolute location information of the fixed object, and the absolute location information of the fixed object is measured in advance. In this embodiment of this application, the sensor is a sensor that can identify the identifier of the fixed object and that can determine, based on a detection signal for the fixed object detected by the sensor, relative location information of a target object relative to the fixed object, for example, a video camera or a camera.

[0041] The sensor may further include a first sensing module and a second sensing module. The first sensing module is configured to obtain the identifier of the fixed object, and the second sensing module is configured to obtain the detection signal.

[0042] In this embodiment of this application, the target object may be a vehicle, a pedestrian, or the like.

[0043] The preset correspondence between the fixed-object identifier and the absolute location information may be prestored in a mobile device, or may be prestored in an intelligent transportation system.

[0044] When the preset correspondence between the fixed-object identifier and the absolute location information is prestored in the intelligent transportation system, the communications device may send the obtained identifier of the fixed object to the intelligent transportation system, and then the intelligent transportation system sends, to the communications device, determined absolute location information corresponding to the identifier of the fixed object.

[0045] It should be understood that, in step 302, the communications device estimates the positioning information of the moving target object according to the absolute location information of the at least one fixed object and the relative location information of the moving target object relative to the at least one fixed object. Specifically, the communications device first determines absolute location information of at least one moving target object according to absolute location information of each fixed object and relative location information of the moving target object relative to the fixed object, and then estimates the positioning information of the moving target object

according to the absolute location information of the at least one target object. Specifically, a manner of estimating the positioning information of the moving target object according to the absolute location information of the at least one target object is similar to a manner in which the second device determines the positioning information of the second device according to the absolute location information of the first target object that is sent by the at least one first device in FIG. 1. Details are not described herein again.

[0046] It should be noted that, in this embodiment of this application, a communications device may further be installed on each fixed object, and these location-known communications devices broadcast, by using a wireless network, correspondences between identifiers and absolute location information of all fixed objects. The communications device in this embodiment of this application obtains the correspondences between the identifiers and the absolute location information of the fixed objects by using a signal in the wireless network. In addition, when the target object is a vehicle or another land transportation tool, after the communications device determines the positioning information of the target object, the positioning information of the target object may further be uploaded to the intelligent transportation system, so that a traffic condition on a road can be known in a timely manner.

[0047] As shown in FIG. 4, a positioning method in an embodiment of this application includes the following steps.

[0048] A first device detects, by using a sensor, a target object that occurs within a range detectable to the sensor.

[0049] When the sensor detects at least one target object, the first device performs step 400 to step 410 for any one of the at least one target object.

[0050] Step 400. The first device determines relative location information of the first device relative to the target object according to a detection signal that is obtained when the sensor detects the target object, where a second device having a communication function is disposed on each target object.

[0051] Step 410. The first device determines absolute location information of the target object according to the relative location information and prestored absolute location information of the first device.

[0052] Step 420. The first device sends, by using a wireless network, absolute location information of each target object to a second device disposed on the target object.

[0053] Step 430. For each of at least one first device, a second device disposed on a first target object and having a communication function receives absolute location information of the at least one target object by using the wireless network, where the absolute location information of the at least one target object is determined by the first device according to a detection signal that is obtained when the sensor detects the at least one target object.

[0054] Step 440. The second device determines at least one piece of first relative location information, where each of the at least one piece of first relative location information is relative location information between two pieces of absolute location information in the absolute location information of the at least one target object.

[0055] Step 450: The second device determines at least one piece of second relative location information according to the detection signal that is obtained when the sensor detects the at least one target object, and each of the at least one piece of second relative location information is relative location information of the first target object relative to one of the at least one target object.

[0056] Step 460. The second device determines absolute location information of the first target object from the absolute location information of the at least one target object by performing matching between the at least one piece of first relative location information and the at least one piece of second relative location information.

[0057] Step 470. The second device determines positioning information of the first target object according to the determined absolute location information of the first target object.

[0058] In this embodiment of this application, the first device only needs to send the determined at least one piece of absolute location information to the second device through wireless network broadcasting, with no need to obtain an identifier of the second device.

[0059] For example, a second device 1 receives absolute location information 1, absolute location information 2, and absolute location information 3 that are sent by a first device 1, and determines first relative location information 1, first relative location information 2, and first relative location information 3, respectively. The first relative location information 1 is a difference between the absolute location information 1 and the absolute location information 2. The first relative location information 2 is a difference between the absolute location information 1 and the absolute location information 3. The first relative location information 3 is a difference between the absolute location information 2 and the absolute location information 3. Assuming that the absolute location information 1 is (x1, y1, z1) and the absolute location information 2 is (x2, y2, z2), the first relative location information 1 is (x1-x2, y1-y2, z1-z2). One piece of absolute location information in the absolute location information 1, the absolute location information 2, and the absolute location information 3 is absolute location information of a target object disposed with the second device 1. Generally, target locations of surrounding objects of the target object disposed with the second device 1 is the other two absolute locations in the absolute location information 1, the absolute location information 2, and the absolute location information 3. The second device 1 determines second relative location information 1 and second relative location information 2 by using a detection signal that is obtained when the sensor detects at least one surrounding target object, and then performs matching be-

tween the second relative location information 1, the second relative location information 2, the first relative location information 1, the first relative location information 2, and the first relative location information 3. Assuming that the second relative location information 1 is close to the first relative location information 2 and the second relative location information 2 is close to the first relative location information 1, absolute location information of the target object disposed with the second device 1 is the absolute location information 1 in the absolute location information 1, the absolute location information 2, and the absolute location information 3.

[0060] A manner in which the second device 1, when receiving absolute location information of another first device, determines the absolute location information of the target object disposed with the second device 1 is similar to a manner in which the second device 1, when receiving the absolute location information of the first device 1, determines the absolute location information of the target object disposed with the second device 1, and details are not described herein again.

[0061] In this embodiment of this application, the first relative location information may alternatively be determined by the first device and then sent to the second device.

[0062] Based on a same concept, the embodiments of this application further provide a first device 500a shown in FIG. 5a and a second device 600a shown in FIG. 6a. A method corresponding to the first device shown in FIG. 5a and the second device shown in FIG. 6a is the positioning method shown in FIG. 1 in the embodiments of this application. Therefore, for implementation of the first device 500a shown in FIG. 5a and the second device 600a shown in FIG. 6a in the embodiments of this application, refer to implementation of the method. Details are not described herein again. As shown in FIG. 5a, the first device 500a in an embodiment of this application includes a processing unit 510a and a transceiver unit 520a.

[0063] The processing unit 510a is configured to control a sensor to detect a target object that occurs within a range detectable to the sensor, and perform the following operations when the sensor detects any target object: determining relative location information of the first device relative to the target object according to a detection signal that is obtained when the sensor detects the target object, and determining absolute location information of the target object according to the relative location information and prestored absolute location information of the first device, where a second device having a communication function is disposed on each target object; and the transceiver unit 520a is configured to send, by using a wireless network, the absolute location information of the target object to the second device disposed on the target object.

[0064] In a possible implementation, the sensor is a video camera or a camera. The processing unit 510a is further configured to control the sensor to obtain a target

object identifier attached to the target object, and the transceiver unit 520a is specifically configured to send, by using the wireless network, the obtained target object identifier and the absolute location information of the target object to the second device disposed on the target object; or

when the sensor is a video camera or a camera, the processing unit 510a is further configured to control the sensor to obtain a target object identifier attached to the target object, and determine, from a preset correspondence list between a target object identifier and a second-device identifier, a second-device identifier corresponding to the target object identifier, and the transceiver unit 520a is specifically configured to send, according to the determined second-device identifier by using the wireless network, the absolute location information of the target object to the second device disposed on the target object.

[0065] In a possible implementation, the transceiver unit 520a is specifically configured to: broadcast a data packet by using the wireless network, where the data packet includes a correspondence between a target object identifier of each target object detected by the first device by using the sensor and absolute location information of each target object; or

broadcast a data packet by using the wireless network, where the data packet includes a correspondence between a second-device identifier of each target object detected by the first device by using the sensor and absolute location information of each target object.

[0066] In a possible implementation, the sensor is installed on the first device 500a, or the sensor is connected to the first device 500a in a wireless or wired manner.

[0067] It should be noted that the sensor is connected to the first device 500a. Generally, the sensor sends a signal to the transceiver unit 520a. Then, the processing unit 510a obtains, from the transceiver unit 520a, the signal detected by the sensor. It should be understood that in this embodiment of this application, in a possible implementation, the processing unit 510a may alternatively obtain, directly from the sensor, the signal detected by the sensor.

[0068] When the sensor is connected to the first device 500a in a wireless manner, specifically, a connection to the first device 500a may be established in a wireless manner such as a wireless network, infrared, or Bluetooth.

[0069] In a possible implementation, the target object is a vehicle, and the target object identifier is a vehicle license plate number.

[0070] It should be noted that the processing unit 510a in this embodiment of this application may be a processor, and the transceiver unit 520a may be a transceiver. As shown in FIG. 5b, a first device 500b may include a processor 510b, a transceiver 520b, and a memory 530b. The memory 530b may be configured to store a program/code preinstalled in the first device 500b before delivery or may store code or the like used for execution

of the processor 510b.

[0071] The processor 510b may be a general-purpose central processing unit (Central Processing Unit, CPU), a microprocessor, an application-specific integrated circuit (Application Specific Integrated Circuit, ASIC), or one or more integrated circuits, and is configured to perform a related operation, so as to implement the technical solution provided in this embodiment of this application.

[0072] It should be noted that, although only the processor 510b, the transceiver 520b, and the memory 530b are shown for the first device 500b shown in FIG. 5b, in a specific implementation process, a person skilled in the art should understand that the first device 500b further includes another component necessary for normal operation. In addition, according to a specific requirement, a person skilled in the art should understand that the first device 500b may further include a hardware component that implements another additional function. In addition, a person skilled in the art should understand that the first device 500b may alternatively include only a component or module necessary for implementing this embodiment of this application, but does not need to include all components shown in FIG. 5b.

[0073] A person of ordinary skill in the art may understand that all or some of the processes of the methods in the foregoing embodiments may be implemented by a computer program instructing relevant hardware. The program may be stored in a computer-readable storage medium. When the program runs, the processes of the method embodiments may be performed. The storage medium may be a magnetic disk, an optical disc, a read-only memory (Read-Only Memory, ROM), a random access memory (Random Access Memory, RAM), or the like.

[0074] As shown in FIG. 6a, the second device 600a in an embodiment of this application includes a transceiver unit 620a and a processing unit 610a, and the second device 600a is disposed on a first target object.

[0075] The transceiver unit 620a is configured to receive, by using a wireless network, absolute location information of the first target object that is sent by at least one first device, where the absolute location information of the first target object that is sent by the at least one first device is determined by the at least one first device according to a detection signal that is obtained when a sensor detects the first target object.

[0076] The processing unit 610a is configured to determine positioning information of the first target object according to the absolute location information of the first target object that is sent by the at least one first device.

[0077] In a possible implementation, the sensor is a video camera or a camera; the transceiver unit 620a is specifically configured to: receive at least one data packet by using the wireless network, where each data packet is broadcast by one first device, and each data packet includes a correspondence between a target object identifier of each target object detected by the first device by using the sensor and absolute location information of

each target object; and the processing unit 610a is specifically configured to determine the absolute location information of the first target object as absolute location information that is corresponding to a target object identifier of the first target object and that is in the at least one data packet.

[0078] In a possible implementation, the sensor is a video camera or a camera; the transceiver unit 620a is specifically configured to receive at least one data packet by using the wireless network, where each data packet is broadcast by one first device, and each data packet includes a correspondence between an identifier of a communications device on each target object detected by the first device by using the sensor and absolute location information of each target object; and the processing unit 610a is specifically configured to: determine the absolute location information of the first target object as absolute location information that is corresponding to an identifier of a communications device the same as an identifier of the second device and that is in the at least one data packet.

[0079] In a possible implementation, the sensor is installed on the first device, or the sensor is connected to the first device in a wireless or wired manner.

[0080] In a possible implementation, the first target object is a vehicle, and an identifier of the first target object is a vehicle license plate number.

[0081] In a possible implementation, the processing unit 610a is specifically configured to: determine the positioning information of the first target object as one piece of absolute location information in the absolute location information of the first target object that is sent by the at least one first device; or determine the positioning information of the first target object as an average value of the absolute location information of the first target object that is sent by the at least one first device.

[0082] It should be noted that the processing unit 610a in this embodiment of this application may be a processor, and the transceiver unit 620a may be a transceiver. As shown in FIG. 6b, a second device 600b may include a processor 610b, a transceiver 620b, and a memory 630b. The memory 630b may be configured to store a program/code preinstalled in the second device 600b before delivery or may store code or the like used for execution of the processor 610b.

[0083] The processor 610b may be a general-purpose CPU, a microprocessor, an ASIC, or one or more integrated circuits, and is configured to perform a related operation, so as to implement the technical solution provided in this embodiment of this application. It should be noted that, although only the processor 610b, the transceiver 620b, and the memory 630b are shown for the second device 600b shown in FIG. 6b, in a specific implementation process, a person skilled in the art should understand that the second device 600b further includes another component necessary for normal operation. In addition, according to a specific requirement, a person

skilled in the art should understand that the second device 600b may further include a hardware component that implements another additional function. In addition, a person skilled in the art should understand that the second device 600b may alternatively include only a component or module necessary for implementing this embodiment of this application, but does not need to include all components shown in FIG. 6b.

[0084] A person of ordinary skill in the art may understand that all or some of the processes of the methods in the foregoing embodiments may be implemented by a computer program instructing relevant hardware. The program may be stored in a computer-readable storage medium. When the program runs, the processes of the method embodiments may be performed. The storage medium may be a magnetic disk, an optical disc, a ROM, a RAM, or the like.

[0085] Based on a same idea, the embodiments of this application further provide a communications device 700a shown in FIG. 7a. A method corresponding to the communications device 700a shown in FIG. 7a is the positioning method shown in FIG. 3 in the embodiments of this application. Therefore, for implementation of the communications device 700a shown in FIG. 7a in the embodiments of this application, refer to implementation of the method. Details are not described herein again.

[0086] As shown in FIG. 7a, the communications device 700a in an embodiment of this application includes a processing unit 710a and a transceiver unit 720a, and the communications device 700a is disposed on a moving target object.

[0087] The transceiver unit 720a is configured to receive an identifier that is of at least one fixed object occurring in a moving environment and that is detected and sent when a sensor disposed on the moving target object detects the at least one fixed object occurring in the moving environment, and relative location information of the moving target object relative to the at least one fixed object; and the processing unit 710a is configured to determine, from a preset correspondence between a fixed-object identifier and absolute location information according to the identifier of the at least one fixed object, absolute location information corresponding to the identifier of the at least one fixed object, and estimate positioning information of the moving target object according to the absolute location information of the at least one fixed object and the relative location information of the moving target object relative to the at least one fixed object.

[0088] It should be noted that the processing unit 710a in this embodiment of this application may be a processor, and the transceiver unit 720a may be a transceiver. As shown in FIG. 7b, a communications device 700b may include a processor 710b, a transceiver 720b, and a memory 730b. The memory 730b may be configured to store a program/code preinstalled in the communications device 700b before delivery or may store code or the like used for execution of the processor 710b.

[0089] The processor 710b may be a general-purpose CPU, a microprocessor, an ASIC, or one or more integrated circuits, and is configured to perform a related operation, so as to implement the technical solution provided in this embodiment of this application.

[0090] It should be noted that, although only the processor 710b, the transceiver 720b, and the memory 730b are shown for the communications device 700b shown in FIG. 7b, in a specific implementation process, a person skilled in the art should understand that the communications device 700b further includes another component necessary for normal operation. In addition, according to a specific requirement, a person skilled in the art should understand that the communications device 700b may further include a hardware component that implements another additional function. In addition, a person skilled in the art should understand that the communications device 700b may alternatively include only a component or module necessary for implementing this embodiment of this application, but does not need to include all components shown in FIG. 7b.

[0091] A person of ordinary skill in the art may understand that all or some of the processes of the methods in the foregoing embodiments may be implemented by a computer program instructing relevant hardware. The program may be stored in a computer-readable storage medium. When the program runs, the processes of the method embodiments may be performed. The storage medium may be a magnetic disk, an optical disc, a ROM, a RAM, or the like.

[0092] Based on a same concept, the embodiments of this application further provide a second device 800a shown in FIG. 8a. A method corresponding to the second device shown in FIG. 8a is the positioning method shown in FIG. 4 in the embodiments of this application. Therefore, for implementation of the second device 800a shown in FIG. 8a in the embodiments of this application, refer to implementation of the method. Details are not described herein again.

[0093] As shown in FIG. 8a, the second device 800a in an embodiment of this application includes a transceiver unit 820a and a processing unit 810a, and the second device 800a is disposed on a first target object and has a communication function.

[0094] The transceiver unit 820a is configured to: for each of at least one first device, receive absolute location information of at least one target object, where the absolute location information of the at least one target object is determined by the first device according to a detection signal that is obtained when a sensor detects the at least one target object.

[0095] The processing unit 810a is configured to: determine at least one piece of first relative location information, where each of the at least one piece of first relative location information is relative location information between two pieces of absolute location information in the absolute location information of the at least one target object; determine at least one piece of second relative

location information according to the detection signal that is obtained when the sensor detects the at least one target object, where each of the at least one piece of second relative location information is relative location information of the first target object relative to one of the at least one target object; determine absolute location information of the first target object from the absolute location information of the at least one target object by performing matching between the at least one piece of first relative location information and the at least one piece of second relative location information; and determine positioning information of the first target object according to the determined absolute location information of the first target object.

[0096] It should be noted that the processing unit 810a in this embodiment of this application may be a processor, and the transceiver unit 820a may be a transceiver. As shown in FIG. 8b, a second device 800b may include a processor 810b, a transceiver 820b, and a memory 830b. The memory 830b may be configured to store a program/code preinstalled in the second device 800b before delivery or may store code or the like used for execution of the processor 810b.

[0097] The processor 810b may be a general-purpose CPU, a microprocessor, an ASIC, or one or more integrated circuits, and is configured to perform a related operation, so as to implement the technical solution provided in this embodiment of this application.

[0098] It should be noted that, although only the processor 810b, the transceiver 820b, and the memory 830b are shown for the second device 800b shown in FIG. 8b, in a specific implementation process, a person skilled in the art should understand that the second device 800b further includes another component necessary for normal operation. In addition, according to a specific requirement, a person skilled in the art should understand that the second device 800b may further include a hardware component that implements another additional function. In addition, a person skilled in the art should understand that the second device 800b may alternatively include only a component or module necessary for implementing this embodiment of this application, but does not need to include all components shown in FIG. 8b.

[0099] A person of ordinary skill in the art may understand that all or some of the processes of the methods in the foregoing embodiments may be implemented by a computer program instructing relevant hardware. The program may be stored in a computer-readable storage medium. When the program runs, the processes of the method embodiments may be performed. The storage medium may be a magnetic disk, an optical disc, a ROM, a RAM, or the like.

[0100] To sum up, according to the technical solution in the embodiments of this application, the second device can implement positioning of the target object according to the absolute location information of the target object that is sent by the first device. Therefore, this resolves a prior-art problem that positioning of a target object cannot

be implemented when there is no GPS signal. Compared with a solution in the prior art that positioning of a target object is implemented by scanning a surrounding object of the target object and performing comparison with a preset high-precision map, this solution is easy to implement, improves operability of positioning, and increases positioning precision of the target object by increasing precision of the sensor.

[0101] A person skilled in the art should understand that the embodiments of this application may be provided as a method, a system, or a computer program product. Therefore, the embodiments of this application may be in a form of hardware only embodiments, software only embodiments, or embodiments with a combination of software and hardware. Moreover, the embodiments of this application may use a form of a computer program product that is implemented on one or more computer-usable storage media (including but not limited to a disk memory, a CD-ROM, an optical memory, and the like) that include computer-usable program code.

[0102] The embodiments of this application are described with reference to the flowcharts and/or block diagrams of the method, the device (system), and the computer program product according to the embodiments of this application. It should be understood that computer program instructions may be used to implement each process and/or block in the flowcharts and/or the block diagrams and a combination of a process and/or a block in the flowcharts and/or the block diagrams. These computer program instructions may be provided for a general-purpose computer, a dedicated computer, an embedded processor, or a processor of any other programmable data processing device to generate a machine, so that the instructions executed by the computer or the processor of any other programmable data processing device generate an apparatus for implementing a specified function in one or more processes in the flowcharts and/or in one or more blocks in the block diagrams.

[0103] These computer program instructions may also be stored in a computer readable memory that can instruct the computer or any other programmable data processing device to work in a specific manner, so that the instructions stored in the computer readable memory generate an artifact that includes an instruction apparatus. The instruction apparatus implements a specified function in one or more processes in the flowcharts and/or in one or more blocks in the block diagrams.

[0104] These computer program instructions may be installed onto a computer or another programmable data processing device, so that a series of operation steps are performed on the computer or the another programmable device, thereby generating computer-implemented processing. In this way, the instructions executed on the computer or the another programmable device provide steps for implementing a specified function in one or more processes in the flowcharts and/or in one or more blocks in the block diagrams.

[0105] thereof.

Claims

1. A positioning method, comprising:

detecting, by a first device by using a sensor, a target object that occurs within a range detectable to the sensor; and
determining (100), according to a detection signal that is obtained when the sensor detects the target object, relative location information of the first device relative to the target object;
determining (110), by the first device, absolute location information of the target object according to the relative location information and prestored absolute location information of the first device;
wherein a second device having a communication function is disposed on each target object; wherein the sensor is a video camera or a camera; and the method further comprises:

obtaining, by the first device by using the sensor, a target object identifier attached to the target object;
determining, from a preset correspondence list between a target object identifier and a second-device identifier, a second-device identifier corresponding to the target object identifier; and
sending, by the first device according to the determined second-device identifier by using the wireless network, the absolute location information of the target object to the second device disposed on the target object;

wherein the sending the absolute location information of the target object to the second device disposed on the target object comprises:

broadcasting, by the first device, a data packet by using the wireless network, wherein the data packet comprises a correspondence between a second-device identifier of each target object detected by the first device by using the sensor and absolute location information of each target object.

2. A positioning method, comprising:

receiving (130), by a second device disposed on a first target object and having a communication function, by using a wireless network, absolute location information of the first target object that is sent by at least one first device; and
determining (140), by the second device, positioning information of the first target object according to the absolute location information of the first target object that is sent by the at least

- one first device;
 wherein the receiving comprises:
 receiving, by the second device, the at least one
 data packet by using the wireless network,
 wherein each data packet is broadcast by one
 first device, and each data packet comprises a
 correspondence between a second-device
 identifier corresponding to a target object identifier
 attached to each target object detected by
 the first device by using a video camera or a
 camera and absolute location information of
 each target object, and determining the absolute
 location information of the first target object as
 absolute location information that is correspond-
 ing to an identifier of the second device and that
 is in the at least one data packet.
3. The method according to claim 2, wherein the first
 target object is a vehicle, and an identifier of the first
 target object is a vehicle license plate number.
4. The method according to claim 2, wherein the deter-
 mining, by the second device, positioning informa-
 tion of the second device according to the absolute
 location information of the first target object that is
 sent by the at least one first device comprises:
 determining, by the second device, the position-
 ing information of the first target object as one
 piece of absolute location information in the ab-
 solute location information of the first target ob-
 ject that is sent by the at least one first device; or
 determining, by the second device, the position-
 ing information of the first target object as an
 average value of at least one piece of absolute
 location information of the first target object that
 is sent by the at least one first device.
5. A device (600a), comprising a transceiver unit (620a)
 and a processing unit (610a), wherein the device is
 disposed on a target object;
 the transceiver unit (620a) is configured to receive,
 by using a wireless network, absolute location infor-
 mation of the first target object that is sent by at least
 one first device; and
 the processing unit (610a) is configured to determine
 positioning information of the first target object ac-
 cording to the absolute location information of the
 first target object that is sent by the at least one first
 device;
 the transceiver unit (620a) is specifically configured
 to:
 receive at least one data packet by using the
 wireless network, wherein each data packet is
 broadcast by one first device, and each data
 packet comprises a correspondence between a tar-
- get object identifier attached to each target ob-
 ject detected by the first device by using a video
 camera or a camera and absolute location infor-
 mation of each target object; and
 the processing unit (610a) is specifically config-
 ured to:
 determine the absolute location information of
 the first target object to be absolute location infor-
 mation that is corresponding to an identifier
 of a communications device the same as an
 identifier of the device and that is in the at least
 one data packet.
6. The device according to claim 5, wherein the
 processing unit (610a) is specifically configured to:
 determine the positioning information of the first
 target object as one piece of absolute location
 information in the absolute location information
 of the first target object that is sent by the at least
 one first device; or
 determine the positioning information of the first
 target object as an average value of the absolute
 location information of the first target object that
 is sent by the at least one first device.
7. A device (500a), comprising a processing unit (510a)
 and a transceiver unit (520a); processing unit (510a)
 is configured to control a sensor to detect a target
 object that occurs within a range detectable to the
 sensor, determine, according to a detection signal
 that is obtained when the sensor detects the target
 object, relative location information of the device re-
 lative to the target object, and determine absolute
 location information of the target object according to
 the relative location information and prestored abso-
 lute location information of the device;
 wherein a second device having a communication
 function is disposed on each target object, the sensor
 is a video camera or a camera;
 the processing unit (510a) is further configured to
 control the sensor to obtain a target object identifier
 attached to the target object, and determine, from a
 preset correspondence list between a target object
 identifier and a second-device identifier, a second-
 device identifier corresponding to the target object
 identifier; and
 the transceiver unit (520a) is configured to send, ac-
 cording to the determined second-device identifier
 by using the wireless network, the absolute location
 information of the target object to the second device
 disposed on the target object;
 wherein the transceiver unit (520a) is specifically
 configured to broadcast a data packet by using the
 wireless network, where the data packet includes a
 correspondence between a second-device identifier
 of each target object detected by the device by using
 the sensor and absolute location information of each

target object.

Patentansprüche

1. Positionierungsverfahren, das Folgendes umfasst:

Erfassen, durch ein erstes Gerät unter Verwendung eines Sensors, eines Zielobjekts, das innerhalb eines für den Sensor erfassbaren Bereichs auftritt; und
Bestimmen (100), gemäß einem Erfassungssignal, das erhalten wird, wenn der Sensor das Zielobjekt erfasst, von relativen Positionsinformationen des ersten Gerätes relativ zum Zielobjekt;
Bestimmen (110), durch das erste Gerät, von absoluten Positionsinformationen des Zielobjekts gemäß den relativen Positionsinformationen und vorgespeicherten absoluten Positionsinformationen des ersten Gerätes;
wobei an jedem Zielobjekt ein zweites Gerät mit einer Kommunikationsfunktion angeordnet ist; wobei der Sensor eine Videokamera oder eine Kamera ist und das Verfahren ferner Folgendes umfasst:

Erhalten, durch das erste Gerät unter Verwendung des Sensors, eines Zielobjektbezeichners, der an dem Zielobjekt angebracht ist;

Bestimmen, aus einer voreingestellten Korrespondenzliste zwischen einem Zielobjektbezeichner und einem zweiten Gerätebezeichner, eines zweiten Gerätebezeichners, der dem Zielobjektbezeichner entspricht; und

Senden, durch das erste Gerät gemäß dem ermittelten Zweitgerätebezeichner unter Verwendung des Drahtlosnetzwerks, der absoluten Positionsinformationen des Zielobjekts an das zweite Gerät, das an dem Zielobjekt angeordnet ist;

wobei das Senden der absoluten Positionsinformationen des Zielobjekts an das zweite Gerät, das an dem Zielobjekt angeordnet ist, Folgendes umfasst:

Rundsenden, durch das erste Gerät, eines Datenpakets unter Verwendung des Drahtlosnetzwerks, wobei das Datenpaket eine Korrespondenz zwischen einem Zweitgerätebezeichner jedes Zielobjekts, das durch das erste Gerät unter Verwendung des Sensors detektiert wurde, und absoluten Positionsinformationen jedes Zielobjekts umfasst.

2. Positionierungsverfahren, das Folgendes umfasst:

Empfangen (130), durch ein zweites Gerät, das an einem ersten Zielobjekt angeordnet ist und eine Kommunikationsfunktion hat, unter Verwendung eines Drahtlosnetzwerks, von absoluten Positionsinformationen des ersten Zielobjekts, die von mindestens einem ersten Gerät gesendet werden; und

Bestimmen (140), durch das zweite Gerät, von Positionierungsinformationen des ersten Zielobjekts gemäß den absoluten Positionsinformationen des ersten Zielobjekts, die von dem mindestens einen ersten Gerät gesendet werden; wobei das Empfangen Folgendes umfasst:

Empfangen, durch das zweite Gerät, des mindestens einen Datenpakets unter Verwendung des Drahtlosnetzwerks, wobei jedes Datenpaket von einem ersten Gerät gesendet wird und jedes Datenpaket eine Entsprechung zwischen einem Zweitgerätebezeichner, der einem Zielobjektbezeichner entspricht, der an jedem Zielobjekt angebracht ist, das von dem ersten Gerät unter Verwendung einer Videokamera oder einer Kamera erfasst wird, und absoluter Positionsinformationen jedes Zielobjekts umfasst, und Bestimmen der absoluten Positionsinformationen des ersten Zielobjekts als absolute Positionsinformationen, die einem Bezeichner des zweiten Gerätes entsprechen und die in dem mindestens einen Datenpaket enthalten sind.

3. Verfahren nach Anspruch 2, wobei das erste Zielobjekt ein Fahrzeug ist, und ein Bezeichner des ersten Zielobjekts ein Fahrzeugkennzeichen ist.

4. Verfahren nach Anspruch 2, wobei das Bestimmen von Positionierungsinformationen des zweiten Gerätes durch das zweite Gerät in Abhängigkeit von den absoluten Positionsinformationen des ersten Zielobjekts, die von dem mindestens einen ersten Gerät gesendet werden, umfasst:

Bestimmen, durch das zweite Gerät, der Positionierungsinformationen des ersten Zielobjekts als ein Stück absoluter Positionsinformationen in den absoluten Positionsinformationen des ersten Zielobjekts, die von dem mindestens einen ersten Gerät gesendet werden; oder Bestimmen, durch das zweite Gerät, der Positionierungsinformationen des ersten Zielobjekts als einen Durchschnittswert von mindestens einem Stück absoluter Positionsinformationen des ersten Zielobjekts, die von dem mindestens einen ersten Gerät gesendet werden.

5. Gerät (600a), das eine Transceiver-Einheit (620a) und eine Verarbeitungseinheit (610a) umfasst, wobei das Gerät an einem Zielobjekt angeordnet ist;

die Transceiver-Einheit (620a) dazu ausgelegt ist, unter Verwendung eines Drahtlosnetzwerks absolute Positionsinformationen des ersten Zielobjekts zu empfangen, die von mindestens einem ersten Gerät gesendet werden; und
 die Verarbeitungseinheit (610a) dazu ausgelegt ist, Positionierungsinformationen des ersten Zielobjekts gemäß den absoluten Positionsinformationen des ersten Zielobjekts zu bestimmen, die von dem mindestens einen ersten Gerät gesendet werden;
 die Transceiver-Einheit (620a) speziell für Folgendes ausgelegt ist:

Empfangen mindestens eines Datenpakets unter Verwendung des Drahtlosnetzwerks, wobei jedes Datenpaket von einem ersten Gerät gesendet wird und jedes Datenpaket eine Entsprechung zwischen einem Zweitgerätebezeichner, der einem Zielobjektbezeichner entspricht, der an jedem Zielobjekt angebracht ist, das von dem ersten Gerät unter Verwendung einer Videokamera oder einer Kamera erfasst wird, und absoluten Positionsinformationen eines jeden Zielobjekts umfasst; und die Verarbeitungseinheit (610a) speziell für Folgendes ausgelegt ist: Bestimmen der absoluten Positionsinformationen des ersten Zielobjekts als absolute Positionsinformationen, die einem Bezeichner eines Kommunikationsgerätes entsprechen, der mit einem Bezeichner des Gerätes übereinstimmt, und die in dem mindestens einen Datenpaket enthalten sind.

6. Gerät nach Anspruch 5, wobei die Verarbeitungseinheit (610a) speziell für Folgendes ausgelegt ist:

Bestimmen der Positionierungsinformationen des ersten Zielobjekts als ein Stück absoluter Positionsinformationen in den absoluten Positionsinformationen des ersten Zielobjekts, die von dem mindestens einen ersten Gerät gesendet werden; oder
 Bestimmen der Positionsinformationen des ersten Zielobjekts als Durchschnittswert der absoluten Positionsinformationen des ersten Zielobjekts, die von dem mindestens einen ersten Gerät gesendet werden.

7. Gerät (500a), das eine Verarbeitungseinheit (510a) und eine Transceiver-Einheit (520a) umfasst;
 die Verarbeitungseinheit (510a) dazu ausgelegt ist, einen Sensor zu steuern, um ein Zielobjekt zu erfassen, das in einem für den Sensor erfassbaren Bereich auftritt, gemäß einem Erfassungssignal, das erhalten wird, wenn der Sensor das Zielobjekt erfasst, relative Positionsinformationen des Gerätes relativ zu dem Zielobjekt zu bestimmen, und absolute Positionsinformationen des Zielobjekts gemäß

den relativen Positionsinformationen und vorgeschriebenen absoluten Positionsinformationen des Gerätes zu bestimmen;

wobei an jedem Zielobjekt ein zweites Gerät mit einer Kommunikationsfunktion angeordnet ist, der Sensor eine Videokamera oder eine Kamera ist; die Verarbeitungseinheit (510a) ferner dazu ausgelegt ist, den Sensor zu steuern, um einen an dem Zielobjekt angebrachten Zielobjektbezeichner zu erhalten, und aus einer voreingestellten Korrespondenzliste zwischen einem Zielobjektbezeichner und einem Zweitgerätebezeichner einen Zweitgerätebezeichner zu bestimmen, der dem Zielobjektbezeichner entspricht; und

die Transceiver-Einheit (520a) dazu ausgelegt ist, entsprechend dem ermittelten Zweitgerätebezeichner unter Verwendung des Drahtlosnetzwerks die absoluten Positionsinformationen des Zielobjekts an das zweite Gerät zu senden, das an dem Zielobjekt angeordnet ist;

wobei die Transceiver-Einheit (520a) speziell dafür ausgelegt ist, ein Datenpaket unter Verwendung des Drahtlosnetzwerks zu senden, wobei das Datenpaket eine Entsprechung zwischen einem Zweitgerätebezeichner für jedes Zielobjekt, das von dem Gerät unter Verwendung des Sensors erfasst wird, und absoluten Positionsinformationen eines jeden Zielobjekts enthält.

Revendications

1. Procédé de positionnement, comprenant :

la détection, par un premier dispositif en utilisant un capteur, d'un objet cible qui se produit dans un rayon détectable par le capteur ; et
 la détermination (100), selon un signal de détection qui est obtenu lorsque le capteur détecte l'objet cible, d'informations de localisation relatives du premier dispositif relativement à l'objet cible ;
 la détermination (110), par le premier dispositif, d'informations de localisation absolues de l'objet cible selon des informations de localisation relatives et des informations de localisation absolues prérangées du premier dispositif ;
 dans lequel un deuxième dispositif ayant une fonction de communication est disposé sur chaque objet cible ; le capteur étant une caméra vidéo ou un appareil photo ; et le procédé comprenant en outre :

l'obtention, par le premier dispositif en utilisant le capteur, d'un identifiant d'objet cible attaché à l'objet cible ;
 la détermination, à partir d'une liste de correspondances prédéfinie entre un identi-

fiant d'objet cible et un identifiant de deuxième dispositif, d'un identifiant de deuxième dispositif correspondant à l'identifiant d'objet cible ; et

l'envoi, par le premier dispositif selon l'identifiant de deuxième dispositif déterminé en utilisant le réseau sans fil, des informations de localisation absolues de l'objet cible au deuxième dispositif disposé sur l'objet cible ;

l'envoi des informations de localisation absolues de l'objet cible au deuxième dispositif disposé sur l'objet cible comprenant : la diffusion, par le premier dispositif, d'un paquet de données en utilisant le réseau sans fil, le paquet de données comprenant une correspondance entre un identifiant de deuxième dispositif de chaque objet cible détecté par le premier dispositif en utilisant le capteur et des informations de localisation absolues de chaque objet cible.

2. Procédé de positionnement, comprenant :

la réception (130), par un deuxième dispositif disposé sur un premier objet cible et ayant une fonction de communication, en utilisant un réseau sans fil, d'informations de localisation absolues du premier objet cible qui sont envoyées par au moins un premier dispositif ; et

la détermination (140), par le deuxième dispositif, d'informations de positionnement du premier objet cible en fonction des informations de localisation absolues du premier objet cible qui sont envoyées par l'au moins un premier dispositif ;

la réception comprenant :

la réception, par le deuxième dispositif, de l'au moins un paquet de données en utilisant le réseau sans fil, chaque paquet de données étant diffusé par un premier dispositif, et chaque paquet de données comprenant une correspondance entre un identifiant de deuxième dispositif correspondant à un identifiant d'objet cible attaché à chaque objet cible détecté par le premier dispositif en utilisant une caméra vidéo ou un appareil photo et d'informations de localisation absolues de chaque objet cible, et la détermination des informations de localisation absolues du premier objet cible comme informations de localisation absolues qui correspondent à un identifiant du deuxième dispositif et qui sont dans l'au moins un paquet de données.

3. Procédé selon la revendication 2, dans lequel le premier objet cible est un véhicule, et un identifiant du premier objet cible est un numéro de plaque d'immatriculation de véhicule.

4. Procédé selon la revendication 2, dans lequel la détermination, par le deuxième dispositif, d'informations de positionnement du deuxième dispositif selon les informations de localisation absolues du premier objet cible qui sont envoyées par l'au moins un premier dispositif comprend :

la détermination, par le deuxième dispositif, d'informations de positionnement du premier objet cible comme un élément des informations de localisation absolues dans les informations de localisation absolues du premier objet cible qui sont envoyées par l'au moins un premier dispositif ; ou

la détermination, par le deuxième dispositif, des informations de positionnement du premier objet cible comme une valeur moyenne d'au moins un élément d'informations de localisation absolues du premier objet cible qui sont envoyées par l'au moins un premier dispositif.

5. Dispositif (600a), comprenant une unité d'émission-réception (620a) et une unité de traitement (610a), le dispositif étant disposé sur un objet cible ;

l'unité d'émission-réception (620a) est configurée pour recevoir, en utilisant un réseau sans fil, des informations de localisation absolues du premier objet cible qui sont envoyées par au moins un premier dispositif ; et

l'unité de traitement (610a) est configurée pour déterminer des informations de positionnement du premier objet cible selon les informations de localisation absolues du premier objet cible qui sont envoyées par l'au moins un premier dispositif ; l'unité d'émission-réception (620a) est spécifiquement configurée pour :

recevoir au moins un paquet de données en utilisant le réseau sans fil, chaque paquet de données étant diffusé par un premier dispositif, et chaque paquet de données comprenant une correspondance entre un identifiant de deuxième dispositif correspondant à un identifiant d'objet cible attaché à chaque objet cible détecté par le premier dispositif en utilisant une caméra vidéo ou un appareil photo et des informations de localisation absolues de chaque objet cible ; et

l'unité de traitement (610a) est spécifiquement configurée pour :

déterminer les informations de localisation absolues du premier objet cible comme étant des informations de localisation absolues qui correspondent à un identifiant d'un dispositif de communication identique à un identifiant du dispositif et qui sont dans l'au moins un paquet de données.

6. Dispositif selon la revendication 5, dans lequel l'unité de traitement (610a) est spécifiquement configurée pour :

déterminer les informations de positionnement du premier objet cible comme un élément d'informations de localisation absolues dans les informations de localisation absolues du premier objet cible qui sont envoyées par l'au moins un premier dispositif ; ou
 déterminer les informations de positionnement du premier objet cible comme une valeur moyenne des informations de localisation absolues du premier objet cible qui sont envoyées par l'au moins un premier dispositif.

7. Dispositif (500a), comprenant une unité de traitement (510a) et une unité d'émission-réception (520a) ;

l'unité de traitement (510a) est configurée pour commander un capteur afin qu'il détecte un objet cible qui se produit dans un rayon détectable par le capteur, déterminer, selon un signal de détection qui est obtenu lorsque le capteur détecte l'objet cible, des informations de localisation relatives du dispositif relativement à l'objet cible, et déterminer des informations de localisation absolues de l'objet cible selon les informations de localisation relatives et des informations de localisation absolues prérangées du dispositif ;
 dans lequel un deuxième dispositif ayant une fonction de communication est disposé sur chaque objet cible, le capteur étant une caméra vidéo ou un appareil photo ; l'unité de traitement (510a) est en outre configurée pour commander le capteur afin qu'il obtienne un identifiant d'objet cible attaché à l'objet cible, et déterminer, à partir d'une liste de correspondances prédéfinie entre un identifiant d'objet cible et un identifiant de deuxième dispositif, un identifiant de deuxième dispositif correspondant à l'identifiant d'objet cible ; et
 l'unité d'émission-réception (520a) est configurée pour envoyer, selon l'identifiant de deuxième dispositif déterminé en utilisant le réseau sans fil, les informations de localisation absolues de l'objet cible au deuxième dispositif disposé sur l'objet cible ; l'unité d'émission-réception (520a) étant spécifiquement configurée pour diffuser un paquet de données en utilisant le réseau sans fil, le paquet de données incluant une correspondance entre un identifiant de deuxième dispositif de chaque objet cible détecté par le dispositif en utilisant le capteur et des informations de localisation absolues de chaque objet cible.

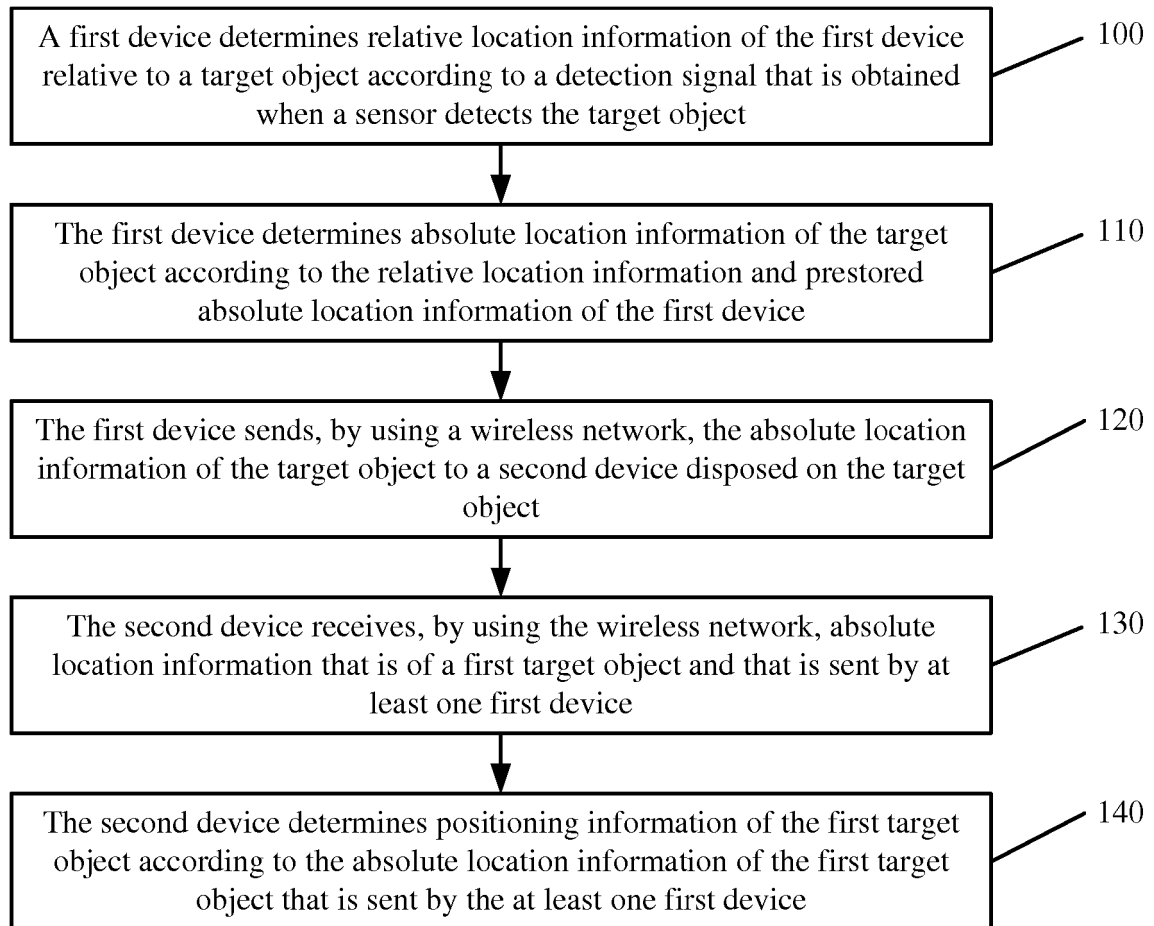


FIG. 1

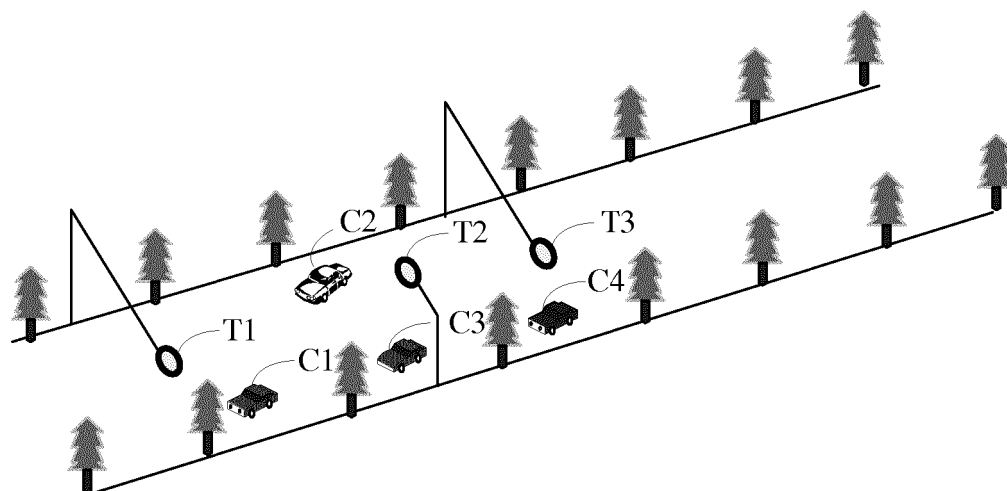


FIG. 2

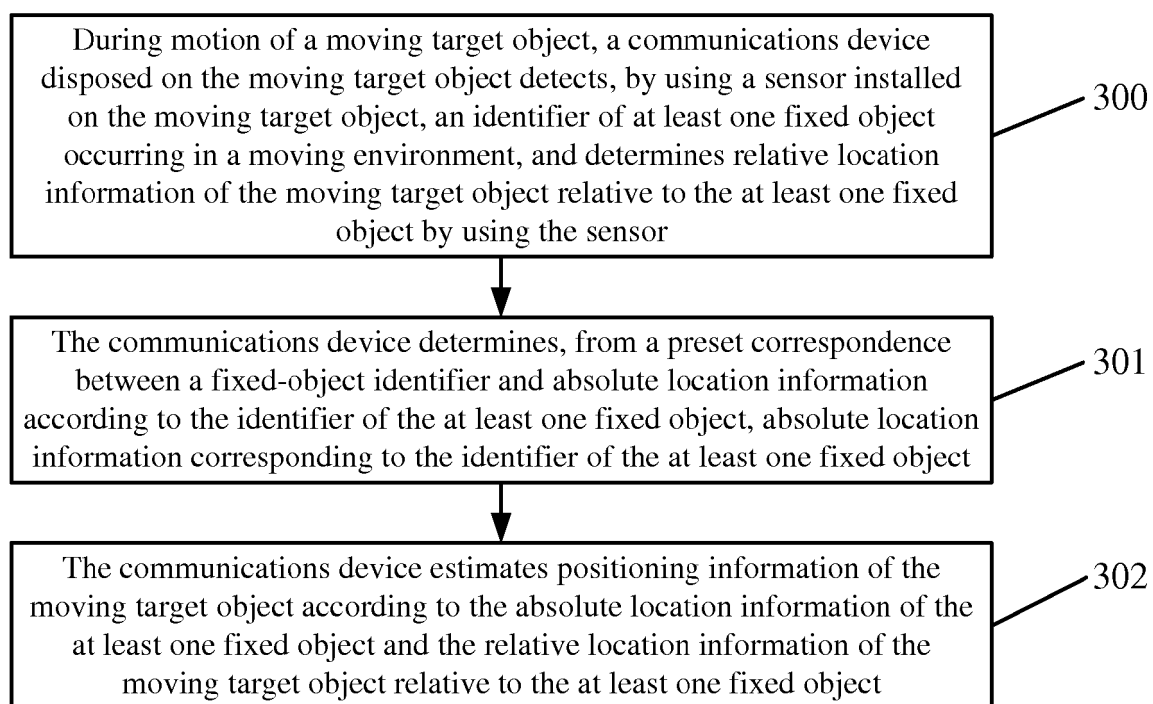


FIG. 3

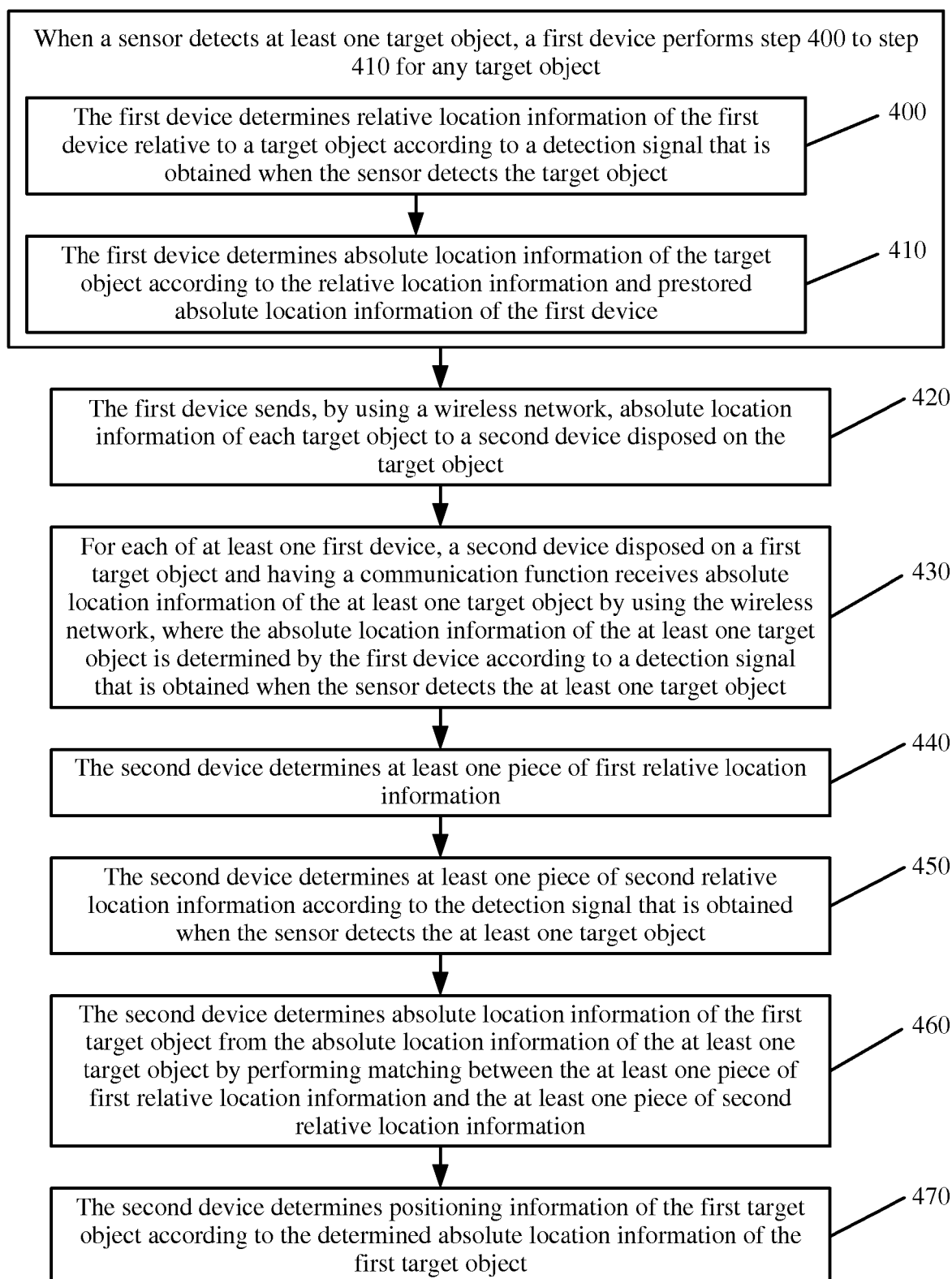


FIG. 4

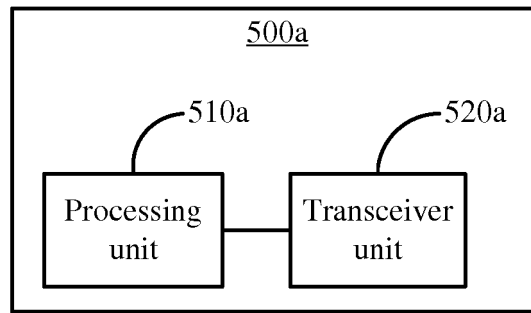


FIG. 5a

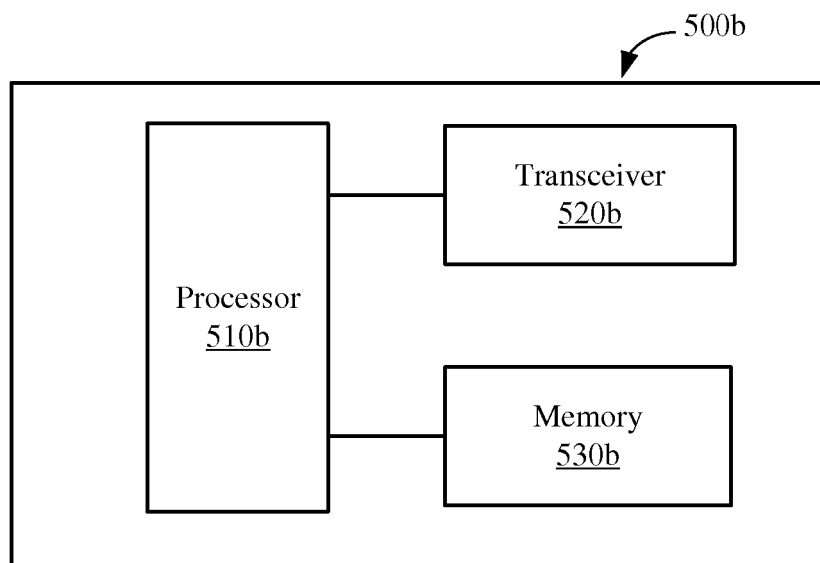


FIG. 5b

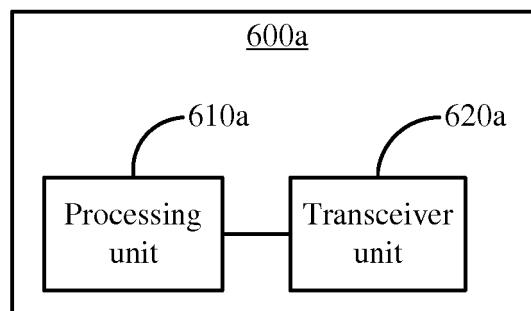


FIG. 6a

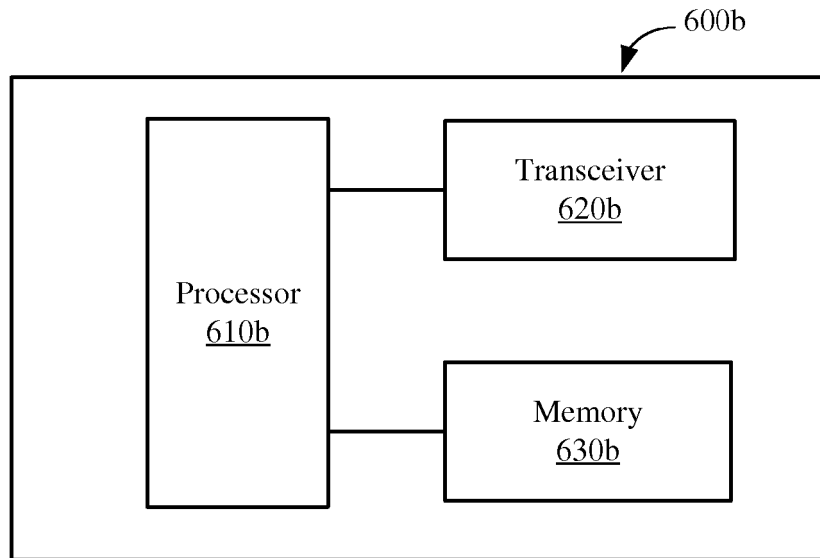


FIG. 6b

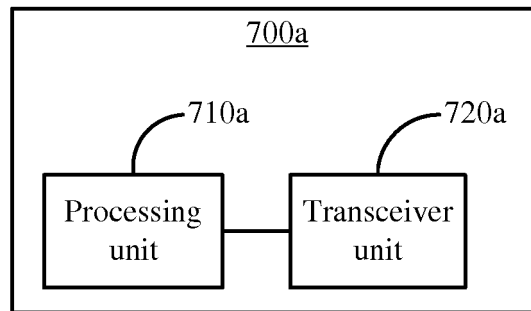


FIG. 7a

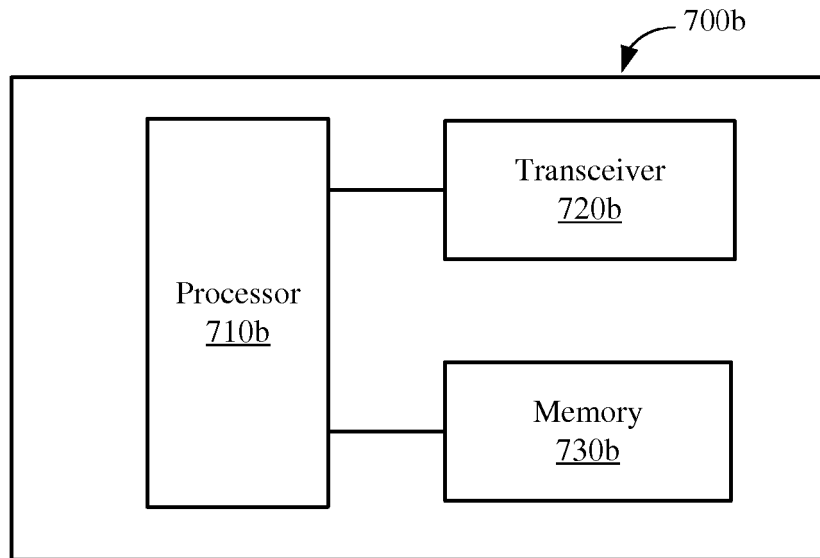


FIG. 7b

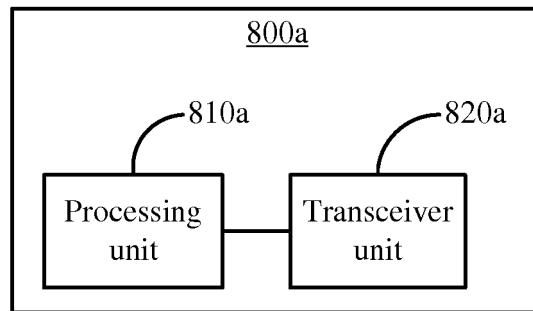


FIG. 8a

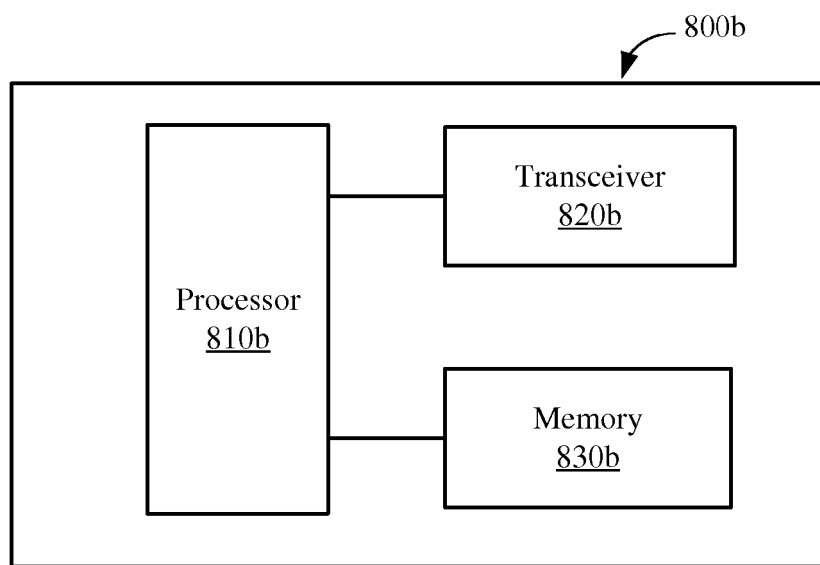


FIG. 8b

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2014092236 A1 [0004]